

PA1998-078248

(19) Korean Intellectual Property Office (KR)

(12) Patent Application Publication (A)

---

(51) Int. Cl.	(11) Publication No	PA1998-078248
HO4N 7/20	(12) Publication Date	1998-11-16

---

(21) Application No	PA1997-015719
(22) Application Date	1997-04-26
(71) Applicant	Samsung Electronics Co., Ltd. Jong-yong Yoon 416, Maetan-dong, Paldal-gu, Suwon-si, Gyeonggi-do
(72) Inventor	Sun-mo Jang 1302/107, Jugong Apt, Woncheon-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do
(74) Agent	Pyeong-sub Lim, Hyun-young Jung, Jae-hui Choi

---

Examination Request: Requested

(54) Analog/Digital Broadcasting Receiving Device of Set Top Box

*Abstract*

Disclosed herein is the analog/digital broadcasting receiving device of the set top box by receiving both analog broadcasting and digital broadcasting through one single set top box.

The present invention, in the set top box consisting of the diplexer rejecting the interference of carrier wave received through a satellite broadcasting tuner; filtering means detecting a band of digital signal in the carrier wave where the above-mentioned interference has been rejected, quadrature amplitude modulation means that converts the above-mentioned carrier wave which is detected into digital carrier wave and modulates amplitude, automatic error correction means that corrects errors of above-mentioned carrier wave data modulated, and MPEG processing means that processes by restoring above-mentioned carrier wave data corrected to video data and audio data according to phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation means: comprises demodulation means that isolates video signal and audio signal by demodulating signal of analog

frequency band among carrier waves gotten by the above-mentioned diplexer, in case that the above-mentioned analog video signal demodulated; in case the above-mentioned analog video signal is scrambled, descrambling means that descrambles it to the original signal; multi-sound processing means that multi-sound processes the analog audio signal demodulated; and at least one selecting means that outputs by respectively selecting a video signal and audio signal between analog video signal and analog audio signal gotten from the above-mentioned descrambling means and multi-sound processing means, video data and audio data gotten from the above-mentioned MPEG processing means

### *Main Drawing*

#### *Drawing 2*

#### *Specification*

#### *Brief Description of Drawing*

Drawing 1 is the block diagram showing digital receiving device of the conventional set top box.

Drawing 2 is the block diagram example provided to the description of analog/digital broadcasting receiving device of the set top box that is this present invention.

Drawing 3 is the drawing that shows frequency band input in case of hybrid fever curb communication network architecture to explain this present invention.

#### *<Description of Codes for Main Parts of Drawing>*

201 : Satellite Broadcasting Tuner	202 : Diplexer
203 : Filtering Part	204: Analog/Digital Converting Part
205 : Quadrature Amplitude Modulation Part	206 : Automatic Error Correction Part
207: Quadrature Phase Shift Keying (QPSK) Modulation Part	208 : Demodulation Part
209 : Multi-Sound Processing Part	210 : Descrambling Part
211 : MPEG Processing Part	

### *The Detail Description of Invention*

#### *Purpose of Invention*

#### *Technical Field of the Invention and the Conventional Technology in the Field*

The present invention is for the analog/digital broadcasting receipt of set top box, especially for the analog/digital broadcasting receiving device of the set top box that enables to selectively receive terrestrial broadcasting or analog cable broadcasting according to an audience preference provided by a program provider or service provider in the device using digital transmission such as HDTV (High-Definition Television).

Recently, the format of method transmitting information (data) is being changed from analog format to digital format by the rapid development of information media.

Then, complying with the request that much more information should be transmitted in the same time, the transmission is done by compressing data by the data compression standard 'MPEG'

MPEG is simply referred to as (Moving Picture Experts Group: International Standard of Media Integrator Video Compression), and it is the encoding method standardized by ISO (International Organization) for digital moving pictures encoding (compression), sound encoding, and multiplying and dividing method to use in all the communication•broadcasting•storage media•computer fields.

This MPEG transmits by compressing Audio Visual that is sound signal, moving pictures and still pictures with high compression rate, so that multi-channel and high quality of transmission effect can be gotten in broadcasting, working set size reduction and the effect to record multimedia information onto the low-cost storage media can be gotten in storage media, the advantage that multimedia communication with low cost can be performed can be gotten in communication media, therefore recently it is becoming a core technology of multimedia era.

On the other hand, general television is standardized to process the analog broadcasting signals, an additional converting device called 'Digital Set Top Box' is provided in order to convert compressed and transmitted digital broadcasting signals into analog broadcasting signals by MPEG standard for users to watch the digital broadcasting signals through television with analog method as satellite broadcasting and the other digital broadcasting methods are supplied

The above-mentioned digital set top box is the device converting broadcasting method which the signal processing is possible to television by converting digital video signals such as a program provider or service provider, that is, each broadcasting station or cable broadcasting station, for example, cable television and satellite broadcasting into analog video signals, recently it is being supplied by the needs of consumers to watch the digital broadcasting signals.

Therefore, as it is well known in each broadcasting station or cable broadcasting station, it is provided by converting program analog signals of service into digital signals.

This converted data is delivered to subscribers through communication network after compressed by a designated compression method in order to deliver more information.

The digital set top box as mentioned above is arranged for the above-mentioned subscribers, and then by receiving the above-mentioned digital data, it is displayed on a monitor after converting this digital data into analog signals.

In this manner, there is a receiving device like 'Drawing 1' as a device to display on a monitor by processing digital signals transmitted by compressed in each broadcasting station or cable broadcasting station to analog signals.

The device showed in 'Drawing 1' is described as an example of digital broadcasting receiving device of the original set top box.

The above-mentioned digital receiving device of the set top box consists of the satellite broadcasting tuner (101) that tunes compressed hybrid carrier signals input through input terminal (100) by emitting from each broadcasting station or cable broadcasting station to the frequency of the channel and changes the amplitude of the tuned carrier signals in proportion to the size of phase shift keying modulation signal input from the exterior, the diplexer (102) that rejects mutual interference of video signal and audio signal and provides phase shift keying modulation signal to the satellite broadcasting tuner (101) among the carriers gotten by tuned through the above-mentioned satellite broadcasting tuner (101), the filtering part (103) that samples only the digital signal band by filtering the carrier signal gotten from the diplexer (102), the analog/digital converting part (104) that outputs by converting the sampled analog signal from the above-mentioned filtering part (103) into digital signal, QAM (Quadrature Amplitude Modulation) part (105) that outputs by respectively amplitude modulating to two of digital signals which can have finite values by inputting two of carrier signals which has the same frequency and 90 degree phase difference from the above-mentioned analog/digital converting part (104), the automatic error correction part (106) that outputs by packet data units by correcting carrier data format input by modulated in the above-mentioned QAM (Quadrature Amplitude Modulation) part (105) to correct an error generated by interference between adjacent channels based on extra information, the quadrature phase shift keying (QPSK) modulation part (107) providing the above-mentioned phase shift keying modulation signal to the satellite broadcasting tuner (101) through the diplexer (102) in order to change the instantaneous phase of carrier, MPEG processing part (108) that respectively outputs to video output terminal (112) and

audio output terminal (113) by converting the original composite video signal (CPSV) and audio signal (ADS) as well as by restoring video data and audio data input through the above-mentioned automatic error correction part (106) according to phase shift keying modulation signal of the above-mentioned quadrature phase shift keying (QPSK) modulation part (107), storing them in memory part (110), and the high-frequency modulation part (109) that provides to television receiver through output terminal (111) by modulating the composite video signal (CPSV) and audio signal (ADS) restored in the above-mentioned MPEG processing part (108) to high-frequency signal.

This conventional digital receiving device of set top box, as it is well known, if digital video signal and audio signal for a program are hybrid compressed so that the signals are input as carrier signal through input terminal (100) in each broadcasting station or cable broadcasting station, tunes compressed hybrid carrier signal input by received through the above-mentioned input terminal (100) to the frequency of the channel and changes the amplitude of the tuned carrier signals in proportion to the size of phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation part (107) to be described hereinafter.

In addition, the above-mentioned carrier signal amplitude changed through the above-mentioned satellite broadcasting tuner (101) is provided to the diplexer (102).

The above-mentioned diplexer (102), not only provides to the filtering part (103) by rejecting mutual interference of the compressed video signal and audio signal among carrier signals gotten by tuned through the above-mentioned satellite broadcasting tuner (101) but also provides the phase shift keying modulation signal generated from the above-mentioned quadrature phase shift keying (QPSK) modulation part (107) to the above-mentioned satellite broadcasting tuner (101).

On the other hand, the above-mentioned filtering part (103) filters carrier signals input from the above-mentioned diplexer (102) so that it detects digital signal band that is only from 450MHz to 700 MHz.

The analog carrier signals detected through the above-mentioned filtering part (103) are provided to QAM (Quadrature Amplitude Modulation) part (105) after converting into digital signals through the analog/digital converting part (104).

The above-mentioned QAM (Quadrature Amplitude Modulation) part (105) respectively amplitude modulates to two of digital signals which can have finite values by inputting two of carrier signals which has the same frequency and 90 degree phase difference from the above-mentioned analog/digital converting part (104).

Carrier data amplitude modulated through the above-mentioned QAM (Quadrature Amplitude Modulation) part (105) is provided as the original video and audio packet data to MPEG processing part (108) by correcting an error generated by interference between adjacent channels in the automatic error correction part (106).

On the other hand, in the above-mentioned quadrature phase shift keying (QPSK) modulation part (107) the phase shift keying modulation signal is generated so that it is provided to the MPEG processing part (108).

Therefore, the above-mentioned MPEG processing part (108) stores video data and audio data input by the above-mentioned automatic error correction part (106) by syncing\*restoring to phase shift keying (QPSK) modulation signal of quadrature phase shift keying (QPSK) modulation part (107) in Memory part (110), it also respectively outputs to video output terminal (112) and audio output terminal (113) by converting the original composite video signal (CPSV) and audio signal (ADS), and it provides to the high-frequency modulation part (109) as well.

The above-mentioned high-frequency modulation part (109) modulates the MPEG processed composite video signal (CPSV) and audio signal (ADS) to high-frequency signals in MPEG processing part (108) and then repeatedly provides these signals to the television receiver through the output terminal (111), so that an audience can watch the digital broadcasting through a color image receiving tube.

In addition, the composite video signal (CPSV) and audio signal (ADS) output by the above-mentioned video output terminal (112) and audio output terminal (113) are recorded onto a magnetic recording media by providing to a digital video disc player or digital VCR.

#### *Requirement for Solution of Technical Problem of Invention*

The stated conventional analog/digital broadcasting receiving device of set top box, however, as it is well known, in case received broadcasting signal and cable signal are a digital signal, displays by the color image receiving tube by receiving these signals, but it is impossible to receive the analog signal directly in case of terrestrial broadcasting or analog cable broadcasting.

Therefore, as for the conventional set top box, there is the problem to watch only digital broadcasting inevitably through the set top box due to the fact that it is impossible to receive the analog signal transmitted by terrestrial broadcasting or analog cable broadcasting.

It is desirable the analog/digital broadcasting receiving device of the set top box which is possible to receive the analog/digital broadcasting having more equal than the conventional condition without concerning that terrestrial broadcasting or analog cable broadcasting cannot be watched.

Therefore, the present invention has excluded the status of the set top box that terrestrial broadcasting or analog cable broadcasting cannot be watched from the stated conventional technology, from the viewpoint of this, the invention aims to provide analog/digital broadcasting receiving device of the set top box enabling to display on monitor by receiving both of analog broadcasting and digital broadcasting through one single set top box.

From another viewpoint of the present invention, it aims to display a broadcasting on monitor by the choice of audience by receiving both of analog broadcasting and digital broadcasting

From the other viewpoint of the present invention, it aims to provide convenience and keep compatibility with television receiver by receiving analog broadcasting and digital broadcasting through one single set top box

From the other viewpoint of the present invention, it aims to multi-process the sound signal received by giving multi-sound function to the set top box

From the other viewpoint of the present invention, it aims to display broadcasting on monitor by giving descrambling function to the set top box in case the signal received is in a scramble

#### *Constitution and Operation of invention*

The analog/digital broadcasting receiving device of the set top box according to one aspect of the present invention to attain the goal, in the set top box consisting of the diplexer rejecting the interference of carrier wave received through a satellite broadcasting tuner; filtering means detecting a band of digital signal in the carrier wave where the above-mentioned interference has been rejected, quadrature amplitude modulation means that converts the above-mentioned carrier wave which is detected into digital carrier wave and modulates amplitude, automatic error correction means that corrects errors of above-mentioned carrier wave data modulated, and MPEG processing means that processes by restoring above-mentioned carrier wave data corrected to video data and audio data according to phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation means: comprises demodulation means that isolates video signal and audio signal by demodulating signal of analog frequency band among carrier waves gotten by the above-mentioned diplexer; and the 1<sup>st</sup> and 2<sup>nd</sup> selecting means that outputs by respectively selecting a video signal and audio signal among the above-mentioned isolated analog video signal and analog audio signal and

multi-sound processing means, video data and audio data by the above-mentioned MPEG processing means.

For the above-mentioned analog/digital broadcasting receiving device of the set top box by the present invention, the 1<sup>st</sup> and 2<sup>nd</sup> selecting means are desirably to respectively select analog video signal and audio signal, and digital video signal and audio signal by interlocking by a single manipulation

For the above-mentioned analog/digital broadcasting receiving device of the set top box by the present invention, it is desirable that, the 2<sup>nd</sup> selecting means selects the digital audio signals in the event of the above-mentioned 1<sup>st</sup> selecting means selects analog video signals, and the 2<sup>nd</sup> selecting means selects the analog audio signals in the event of the above-mentioned 1<sup>st</sup> selecting means selects digital video signals.

The analog/digital broadcasting receiving device of the set top box according to another aspect of the present invention to attain the goal, in the set top box consisting of the diplexer rejecting the interference of carrier wave received through a satellite broadcasting tuner; filtering means detecting a band of digital signal in the carrier wave where the above-mentioned interference has been rejected, quadrature amplitude modulation means that converts the above-mentioned carrier wave which is detected into digital carrier wave and modulates amplitude, automatic error correction means that corrects errors of above-mentioned carrier wave data modulated, and MPEG processing means that processes by restoring above-mentioned carrier wave data corrected to video data and audio data according to phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation means: comprises demodulation means that isolates video signal and audio signal by demodulating signal of analog frequency band among carrier waves gotten by the above-mentioned diplexer; in case the above-mentioned analog video signal is scrambled, descrambling means that descrambles it to the original signal; multi-sound processing means that multi-sound processes the analog audio signal demodulated; and the 1<sup>st</sup> and 2<sup>nd</sup> selecting means that outputs by respectively selecting a video signal and audio signal between analog video signal and analog audio signal gotten from the above-mentioned descrambling means and multi-sound processing means.

In this manner, it is showed that broadcasting is displayed on monitor by the choice of audience by receiving both analog broadcasting and digital broadcasting through one single set top box.

As a consequence, by receiving both analog broadcasting and digital broadcasting through one single set top box, there are benefits not only to provide convenience and but also keep compatibility with television receiver.



As well as this, there is another benefit to watch by spreading information scrambled with multi-sound processing through the additional multi-sound function and descrambling function.

In addition, the multiple examples of the present invention can be existed; the most desirable example shall be described in detail.

The goals, features and benefits of the present invention can be more comprehended through this desirable example.

By referring to enclosed drawing, a desirable example of the analog/digital broadcasting receiving device of the set top box by the present invention shall be described in detail hereinafter.

Also, the present invention can be applied to several broadcasting receiving devices receiving digital broadcasting such as HDTV (High-Definition Television).

Thus, Drawing 2 used to describe is not a specific set top box but the drawing looked by several digital broadcasting receiving devices.

Also, in the description hereinafter, the example using the analog/digital broadcasting receiving device of the set top box with general analog television receiver shall be regarded.

Drawing 2 is the block diagram of example provided to the description of the analog/digital broadcasting receiving device of the set top box of the present invention.

According to the present example, it consists of the satellite broadcasting tuner (201) that tunes compressed hybrid carrier signals input through the input terminal (200) by emitting from each broadcasting station or cable broadcasting station to the frequency of the channel and changes the amplitude of the tuned carrier signals in proportion to the size of phase shift keying modulation signal input from the exterior, the diplexer (202) that rejects mutual interference of video signal and audio signal and provides phase shift keying modulation signal to the satellite broadcasting tuner (201) among the carriers gotten by tuned through the above-mentioned satellite broadcasting tuner (201), the filtering part (203) that samples only the digital signal band among the carrier waves input through the diplexer (202), the analog/digital converting part (204) that outputs by converting the sampled analog signal from the above-mentioned filtering part (203) into digital signal, QAM (Quadrature Amplitude Modulation) (205) that outputs by respectively amplitude modulating to two of digital signals by inputting two of carrier signals which has the same frequency and 90 degree phase difference from the above-mentioned analog/digital converting part (204), the automatic error correction part (206) that outputs by packet data units by correcting carrier data format input by

modulated in the above-mentioned QAM (Quadrature Amplitude Modulation) (205) to correct an error generated by interference between adjacent channels based on extra information, the quadrature phase shift keying (QPSK) modulation part (207) providing the above-mentioned phase shift keying modulation signal to the satellite broadcasting tuner (201) through the diplexer (202) in order to change the instantaneous phase of carrier input through the satellite broadcasting tuner (201), MPEG processing part (211) that not only stores video data and audio data input through the above-mentioned automatic error correction part (206) in the memory part (218) by restoring the video data and audio data according to phase shift keying modulation signal of the above-mentioned quadrature phase shift keying (QPSK) modulation part (207) but also outputs them by converting the original composite video signal (CPSV) and audio signal (ADS), the demodulation part (208) that isolates outputs video signal and audio signal by sampling-demodulating signal of analog frequency band among carrier waves input by the above-mentioned diplexer, descrambling part (210) that, in case that the analog video signal demodulated by the above-mentioned demodulation part (208) is scrambled, descrambles this signal to the original signal, multi-sound processing part (209) that, in case that the analog audio signal demodulated by the above-mentioned demodulation part (208) is multi-sound, outputs by multi-sound processing this signal, the 1st selection part (212) that outputs to the video output terminal (216) by selecting one single video signal between analog video signals input by the descrambling part (210) and digital composite video signals (CPSV) input by the above-mentioned MPEG processing part (211), the 2nd selection part (213) that outputs to the audio output terminal (217) by selecting one single audio signal between analog audio signals processed by the multi-sound processing part (209) and audio signal (ADS) input by the above-mentioned MPEG processing part (211), and the high-frequency modulation part (214) that provides to television receiver through the output terminal (215) by modulating the analog or digital video signal and audio signal selected by the above-mentioned 1st selection part (212) and the 2nd selection part (213).

In addition, drawing 3 is to show the frequency band input in case hybrid fiber curb communication architecture to describe the present invention.

By referring to enclosed drawing, a desirable example of the present invention shall be described in detail hereinafter.

Firstly, if digital video signal and audio signal for a program like Drawing 3 are hybrid compressed so that the signals are input as carrier signal through input terminal (200) in each broadcasting station or cable broadcasting station, the satellite broadcasting tuner (201) tunes compressed hybrid carrier signal input by received through the above-mentioned input terminal (200) to the frequency of the channel and changes the amplitude of the tuned carrier signals in proportion to the size of phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation part (207) to be

described hereinafter.

That is, in other words, in the above-mentioned frequency band of Drawing 3, the range from 5MHz to 30 MHz is T/I (Telephone and Interactive Service) band, the range from 54MHz to 450 MHz is analog signal band, the range from 450MHz to 700 MHz is digital video signal band, and the range to 700 MHz is digital telephone band.

Therefore, the above-mentioned satellite broadcasting tuner (201) tunes the carrier signal having the same frequency band as mentioned above to the channel.

The carrier signal tuned to the above-mentioned channel and amplitude changed through the above-mentioned satellite broadcasting tuner (201) is provided to the diplexer (202).

The above-mentioned diplexer (202), not only provides to the filtering part (203) by rejecting mutual interference of the compressed video signal and audio signal among carrier signals gotten by tuned through the above-mentioned satellite broadcasting tuner (201) and the demodulation part (208) to be described hereinafter, but also provides the phase shift keying modulation signal generated from the above-mentioned quadrature phase shift keying (QPSK) modulation part (207) to the above-mentioned satellite broadcasting tuner (201).

The above-mentioned filtering part (203) is provided to the QAM (Quadrature Amplitude Modulation) part (205) after converted to the digital signal through the analog/digital converting part (204) by sampling the digital signal band whose range is only from 450MHz to 700 MHz. by filtering carrier signals input from the above-mentioned diplexer (202)

The above-mentioned QAM (Quadrature Amplitude Modulation) (205) part provides to the automatic error correction part (206) by respectively amplitude modulating to two of digital signals which can have finite values by inputting two of carrier signals which has the same frequency and 90 degree phase difference from the above-mentioned analog/digital converting part (204).

The above-mentioned automatic error correction part (206) provides to the MPEG processing part (211) as video and audio packet data by correcting an error generated by interference between adjacent channels from the satellite broadcasting tuner (201)

Therefore, the above-mentioned MPEG processing part (208) stores video packet data and audio packet data input by the above-mentioned automatic error correction part (206) by syncing-restoring to the phase shift keying (QPSK) modulation signal generated and input by the quadrature phase shift keying (QPSK) modulation part (107) in the memory part (218), also the digital video signal is

provided to the 1st selection part (212) and the digital audio signal is provided to the 2nd selection part (213) by MPEG processing to the original composite video signal (CPSV) and audio signal (ADS).

On the other hand, the above-mentioned demodulation part (208) isolates/outputs analog video signal and audio signal by demodulating the analog band, that is the carrier signals whose range is from 54MHz to 450MHz, in the same band as Drawing 3 input by the diplexer (202).

The above-mentioned isolated analog audio signals are provided to the multi-sound processing part (209), the analog video signals are provided to the descrambling part (210).

In addition, the above-mentioned multi-sound processing part (209) multi-sound processes if the signals input by the above-mentioned demodulation part (208) are multi-sound, or it directly provides to the 2nd selection part (213) without signal processing.

Also, the above-mentioned descrambling part (210) descrambles in case the analog video signal input by the above-mentioned demodulation part (208) is not in a scramble, and directly provides to the 1st selection part (212) in case the signal is in a scramble.

Therefore, the 1<sup>st</sup> selection part (212) outputs to the video output terminal (216) by selecting a signal between digital composite signal (CPSV) input by the above-mentioned MPEG processing part (211) and analog composite video signal input by the descrambling part (210) by an user, and provides to high-frequency modulation part (214) as well; and the 2<sup>nd</sup> selection part (213) also outputs to the audio output terminal (217) by selecting a signal between digital audio signal (ADS) input by the above-mentioned MPEG processing part (211) and analog audio signal input by the multi-sound processing part (209) by also an user, and provides to high-frequency modulation part (214) as well.

The above-mentioned high-frequency modulation part (214) modulates the input analog or digital video/audio signal to the high-frequency signal, and then provides the signal to the television receiver through the output terminal (215), so that an audience can watch digital or analog broadcasting through a color image receiving tube of the television receiver.

And also, the composite video signal (CPSV) and audio signal (ADS) output by the above-mentioned video output terminal (216) and audio output terminal (217) are recorded onto a magnetic recording media by providing to a digital video disc player or digital VCR.

As it is indicated through the result of the above-mentioned and applied example, video and audio

signals of digital broadcasting output by the above-mentioned MPEG processing part (211) or video and audio signals of analog broadcasting output by descrambling part (210) and multi-sound processing part (209) can be watched by a choice of a user.

On the other hand, as a comparative example, unlike the conventional constitution that is to watch the monitor by MPEG processing the video and audio signals of digital broadcasting through the MPEG processing part of the set top box, the present invention is possible to receive digital broadcasting as well as analog signals transmitted by terrestrial broadcasting or analog cable broadcasting due to the fact that the invention used the 1<sup>st</sup> and 2<sup>nd</sup> selection part to receive analog broadcasting.

From this result, according to the present invention, it is certain that it provides usage convenience and keeps compatibility with television receiver by receiving analog broadcasting and digital broadcasting through one single set top box.

Additionally, it is absolute that there is a possibility to be performed by variously modifying the present invention by person skilled in the art though a specific example has been described and drawn as mentioned above the invention.

These examples must not be individually comprehended from the technical idea or insight of the present invention, these examples should be included in the enclosed patent claim coverage of the invention.

#### *Effects of the Invention*

What is definite from the detail description is, according to the analog/digital broadcasting receiving device of set top box, there is an effect to provide convenience and keep compatibility with television receiver by receiving analog broadcasting and digital broadcasting through one single set top box.

Also, as an extra function, there is an effect to watch by decrypting encrypted information through multi-sound function and descrambling function.

#### *(57) Scope of Claims*

*What is claimed is:*

##### *Claim 1*

In the set top box consisting of the diplexer rejecting the interference of carrier wave received through

a satellite broadcasting tuner; filtering means detecting a band of digital signal in the carrier wave where the above-mentioned interference has been rejected, quadrature amplitude modulation means that converts the above-mentioned carrier wave which is detected into digital carrier wave and modulates amplitude, automatic error correction means that corrects errors of above-mentioned carrier wave data modulated, and MPEG processing means that processes by restoring above-mentioned carrier wave data corrected to video data and audio data according to phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation means:

An analog/digital broadcasting receiving device of the set top box comprising demodulation means that isolates video signal and audio signal by demodulating signal of analog frequency band among carrier waves gotten by the above-mentioned diplexer; and

at least one selecting means that outputs by respectively selecting a video signal and audio signal between analog video signal and analog audio signal gotten from the above-mentioned descrambling means and multi-sound processing means, video data and audio data gotten from the above-mentioned MPEG processing means

*Claim 2*

For Claim 1,

An analog/digital broadcasting receiving device of the set top box having a feature, that the above-mentioned selecting means has the 1<sup>st</sup> and 2<sup>nd</sup> selecting means respectively selecting a video signal and audio signal between analog video signal and analog audio signal.

*Claim 3*

For Claim 2,

An analog/digital broadcasting receiving device of the set top box having a feature, that the above-mentioned 1<sup>st</sup> and 2<sup>nd</sup> selecting means respectively select analog video signal and audio signal, and digital video signal and audio signal by interlocking by a single manipulation.

*Claim 4*

For Claim 2,

An analog/digital broadcasting receiving device of the set top box having a feature, that the 2<sup>nd</sup>

selecting means selects the digital audio signals in the event of the above-mentioned 1<sup>st</sup> selecting means selects analog video signals, and the 2<sup>nd</sup> selecting means selects the analog audio signals in the event of the above-mentioned 1<sup>st</sup> selecting means selects digital video signals.

*Claim 5*

In the set top box consisting of the diplexer rejecting the interference of carrier wave received through a satellite broadcasting tuner; filtering means detecting a band of digital signal in the carrier wave where the above-mentioned interference has been rejected, quadrature amplitude modulation means that converts the above-mentioned carrier wave which is detected into digital carrier wave and modulates amplitude, automatic error correction means that corrects errors of above-mentioned carrier wave data modulated, and MPEG processing means that processes by restoring above-mentioned carrier wave data corrected to video data and audio data according to phase shift keying modulation signal of quadrature phase shift keying (QPSK) modulation means:

An analog/digital broadcasting receiving device of the set top box comprising demodulation means that isolates video signal and audio signal by demodulating signal of analog frequency band among carrier waves gotten by the above-mentioned diplexer;

in case the above-mentioned analog video signal is scrambled, descrambling means that descrambles it to the original signal;

multi-sound processing means that multi-sound processes the analog audio signal demodulated; and at least one selecting means that outputs by respectively selecting a video signal and audio signal between analog video signal and analog audio signal gotten from the above-mentioned descrambling means and multi-sound processing means, video data and audio data gotten from the above-mentioned MPEG processing means.

*Claim 6*

For Claim 5,

An analog/digital broadcasting receiving device of the set top box having a feature, that the above-mentioned selecting means has the 1<sup>st</sup> and 2<sup>nd</sup> selecting means respectively selecting a video signal and audio signal between analog video signal and analog audio signal.

*Claim 7*

For Claim 6,

An analog/digital broadcasting receiving device of the set top box having a feature, that the above-mentioned 1<sup>st</sup> and 2<sup>nd</sup> selecting means respectively select analog video signal and audio signal, and digital video signal and audio signal by interlocking by a single manipulation.

*Drawing*

*Drawing 1*

Input Terminal (100)  
 Satellite Broadcasting Tuner (101)  
 Diplexer (102)  
 Filtering Part (103)  
 Analog/Digital Converting Part (104)  
 QAM (Quadrature Amplitude Modulation) Part (105)  
 Automatic Error Correction Part (106)  
 Quadrature Phase Shift Keying (QPSK) Modulation Part (107)  
 MPEG Processing Part (108)  
 High-Frequency Modulation Part (109)  
 Memory Part (110)  
 Output Terminal (111)  
 Video Output Terminal (112)  
 Audio Output Terminal (113)

*Drawing 2*

Input Terminal (200)  
 Satellite Broadcasting Tuner (201)  
 Diplexer (202)  
 Filtering Part (203)  
 Analog/Digital Converting Part (204)  
 QAM (Quadrature Amplitude Modulation) Part (205)  
 Automatic Error Correction Part (206)  
 Quadrature Phase Shift Keying (QPSK) Modulation Part (207)  
 Demodulation Part (208)  
 Multi-Sound Processing Part (209)  
 Descrambling Part (210)



MPEG Processing Part (211)  
1<sup>st</sup> Selection Part (212)  
2<sup>nd</sup> Selection Part (213)  
High-Frequency Modulation Part (214)  
Output Terminal (215)  
Video Output Terminal (216)  
Audio Output Terminal (217)  
Memory Part (218)

*Drawing 3*

Analog Video  
Digital Video  
Digital Telephone  
Frequency (MHz)